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Dear Jim:

May I go back to the "Index of Selection" - say your treatment in "Methodology", p. 64-65.

Have you completed the theory to take account of age at reproduction? Even if this itself is not heritable, a child born at 20 may be worth nearly $\bar{X}_s$ as many progeny over a similar interval as one born at 40. If it is heritable, so much the more!

Then can you really justify "very little of the difference is actually genotypically determined"? I have in mind the very large effect of color (in what sense is the fertility differential not "genotypic"?) When is a "gene for fertility" independent of the socio-economic context?

I tried to think of any variable that was not "genotypic". So far I could think only of birth rank (for a given kindred-size). (Even here there are second-order effects: maternal-age-dependent "mutations", differential mortality on immunization affecting frequencies by rank, perhaps mate-selection (with its genotypic variation) by birth rank.) Anyhow, I thought it would be interesting to look at fertility by birth rank. Do you know of any data on this? I suppose Luca must have picked this up in his search for mutations (sex, ratio) by grandparental age. However, this should be mainly a cultural matter, not easy to transfer in time or place.

The little reading I have been able to do in this area is rather discouraging: e.g. a widely quoted conclusion: "narrowing differentials in fertility by education" is at p. 253, table 92 of Grabill et al, Fertility of American Women. This is based on the "average deviation of indexes", which seems to me totally meaningless.

Any thoughts on your visiting?

Sincerely yours,

Joshua Lederberg
Professor of Genetics

P.S. Has anyone done a proper statistical treatment of differential fertility by the major (non-orthognal) variables?